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ABSTRACT

This report expands on earlier research that found evidence of strong links between school restructuring and improved learning among students in the first 2 years of high school. This report, based on 1992 National Education Longitudinal Study (NELS) data, analyzes data collected for most of the same students in their last 2 years of high school. The sample was comprised of 9,570 students enrolled in 787 secondary schools nationwide. Hierarchical Linear Modeling (HLM) was used to analyze student engagement and achievement in mathematics, science, history, and reading. The report speculates that restructured schools based on the "organic" model, in which teachers have much greater authority over instruction and curriculum, affect student learning. The organic model is characterized by a common academic curriculum, academic press, authentic instruction, and a collective sense of responsibility. Findings indicate that the presence of organic school-organization characteristics explained much of the improvement in student learning and that the restructuring effects on learning increased during the later years of high school. The report contends that schools, especially high schools, should move toward smaller, more organic structures. The school-within-a-school model could be a promising strategy. Two figures are included. Three different educators respond to the research findings in subsequent articles. (LMI)

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Issues in restructuring schools

Another Look At High School Restructuring

More Evidence That It Improves Student Achievement, And More Insight Into Why

By Valerie E. Lee, Julia B. Smith and Robert G. Croninger

Last fall, we presented compelling evidence that high school restructuring can make a difference for students. By analyzing data on more than 11,000 students enrolled in 820 secondary schools nationwide, we found strong links between restructuring and improved learning by students in the first two years of high school.

In schools that had made significant departures from conventional school organization and practice, students posted bigger academic gains in math, science, history and reading. The achievement gaps between students from different backgrounds were smaller in those schools as well. We also found evidence that students learn more, and that learning is distributed more equitably, in smaller high schools.[1]

In this issue report–the last regular publication of the Center on Organization and Restructuring of Schools–we expand on those findings, by analyzing data on most of those same students in their last two high school years.

We're pleased to report that the positive effects of restructuring and school size observed during the early years of high school also can be found in the later high school years. In fact, the positive impact of restructuring increases a bit in the later grades.

We also look more closely at the question of why restructuring schools boost student learning. We now have a clearer understanding of what makes some schools better places for students to learn.

Last fall, we suggested that the better performance of restructuring schools could be explained by looking at the contrast between schools that are organized bureaucratically and schools that are organized communally. Our latest findings also support that hypothesis. But our latest analysis suggests some specific organizational factors that make such schools work better. We hope these findings encourage educators to emulate those features in schools. [2]

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Bureaucratic Schools

A bureaucratic model has guided the development of secondary schools in the United States, especially since the 1950s. This model calls for the creation of large, comprehensive schools, which offer students a wide choice of courses and activities. Such schools are meant to let each student pursue his or her particular interests, talents and ambitions. The schools are meant to offer something–but not the *same* something–for everyone.

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Under this model, a typical large high school is managed by professional administrators, usually led by the principal. This group governs teachers, students and staff in a "top-down" manner through formalized goals and procedures. Within such schools, educators typically divide the different subjects they teach into specific departments. Across departments, students are placed in different tracks, depending on their academic abilities and career objectives. The tracks would guide students' selections of courses within departments.

As dissatisfaction with the performance of U.S. schools has grown, especially at the high school level, reforms consistent with this governance structure have sought to boost student achievement. These reforms typically have included efforts to strengthen formal controls over teaching and learning by raising graduation requirements, standardizing classroom practice, and holding teachers accountable for student achievement as measured by standardized tests.

These reforms have had some positive effects, such as enrolling more low-achieving students in academic courses. But they haven't brought about the dramatic improvements in student performance the critics have called for. Also, many observers feel that the tightening of bureaucratic controls has diminished teacher commitment, satisfaction and performance.

Such concerns have helped to foster the development of another school of thought on reform, an "organic" or "communal" model that views teaching and learning as processes that can't really be controlled through standardized procedures directed from central authorities.[3]

Instead of directing teachers to follow specific, rigid rules and respond blindly to the decrees of administrators, the organic model says teachers should be encouraged to work together to examine the challenges they face, and then decide–as a team of thoughtful, committed professionals–how best to proceed.

The organic model calls for giving teachers much greater authority over issues of curriculum and instruction. The aim would be to engender a more professional orientation among teachers toward their work. Instead of responding to specific rules and evaluations, teachers would be motivated by commitment to, and identification with, the school's mission. They would work together to identify the challenges faced in their particular school and craft the "best practice" to address them. Teachers might, for example, organize instruction around interdisciplinary teams, and then rely mainly on collaboration to decide what works and what needs revision. The school might also create formal mechanisms for giving teachers more power in the decision-making process.

Characteristics of Organic Schools

The rhetoric of more organic school reform is plentiful, but real change remains rare. High schools that implement reforms often make only incremental changes in how the school operates. Many reform efforts begin on the drawing board as serious undertakings aimed at fundamental change, but end up being modified or watered down in order to avoid threatening the school's existing hierarchy. Those projects that do implement dramatic reform are often run as small "demonstration projects" within a larger school that remains largely untouched by the innovative programs.

Some schools do, however, operate under more organic organizational models. The question we ponder here is: What effects do these kinds of schools have on students?

We examine this question by looking at two important aspects of schools–academic organization and social organization–and identifying certain qualities associated with schools that are more organically organized. We hypothesize that schools with higher levels of these qualities will be more effective and more equitable. In other words, students in those schools will learn more, and the gaps in learning between students of different social backgrounds will be narrower.

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Within a large, bureaucratic school, different students often have very different educational experiences, which are shaped by very different sets of expectations. Students from low-income and minority backgrounds are especially likely to suffer harm from a highly differentiated curriculum.

Academic Organization

Academic organizational features consistent with an organic model would include:

1 - Common Academic Curriculum. Within a large, bureaucratic school, different students often have very different educational experiences, which are shaped by very different sets of expectations. Academic departments divert students into different levels of courses based on past performance, past track placement, ability, interest and aspirations. These courses can vary a great deal: Sometimes the same class can be offered in different versions with very different requirements and expectations. Even in the same school and grade, students at one level can receive a much richer, more challenging education than students in another.

Students from low-income and minority backgrounds are especially likely to suffer harm from a highly differentiated curriculum. Research shows that students from these backgrounds are far more likely to end up

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Figure 1

Frequency of Structural Practices in the 820 Secondary Schools Studied, Classified as Traditional, Moderate, and Restructuring

Structural Practice	Probability
Traditional Practices	
Departmentalization with chairs	.85
Common classes for same curricular track	.76
Staff development focusing on adolescents	.66
PTA or PTO	.64
Parent-teacher conferences each semester	.64
Focus on critical thinking in curriculum	.64
Common classes for different curricular tracks	.62
Increased graduation requirements	.62
Recognition program for good teaching	.56
Parents sent information on how to help kids study	.56
Moderate Practices	
Parent workshops on adolescent problems	.46
Student satisfaction with courses important	.42
Strong emphasis on parental involvement	.38
Strong emphasis on increasing academic requirements	.35
Student evaluation of course content important	.35
Outstanding teachers are recognized	.34
Emphasis on staff stability	.34
Emphasis on staff development activities	.32
Restructuring Practices	
Students keep same homeroom throughout HS	.30
Emphasis on staff solving school problems	.29
Parents volunteer in the school	.28
Interdisciplinary teaching teams	.24
Independent study in English/social studies	.23
Mixed-ability classes in math/science	.21
Cooperative learning focus	.21
Student evaluation of teachers important	.20
Independent study in math/science	.18
School-within-a-school	.15
Teacher teams have common planning time	.11
Flexible time for classes	.09

Each figure in the "probability" column represents the probability that an average high school (one which reports that it has adopted 11 to 13 of the 30 reform practices listed here) engages in each practice.

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in less challenging classes. Research also shows that those students are especially helped by schools when a well-defined curricular focus, based on a strong academic component, is experienced by all students. In such schools, low-income and minority students take more academic courses, and there is less variation in the school between the expectations and work offered in different classes.

This clearer, common focus on high-level learning for all students has been associated with Catholic schools, but evidence suggests that public schools with similar structures would also post higher levels of achievement and narrower performance gaps between students from different socioeconomic and racial/ethnic backgrounds.[4]

Authentic instruction presents complex challenges to teachers. There is no tried-and-true procedure for bringing it about in every school and classroom.

2 - Academic Press.
In a school with high levels of academic press, all students are expected to meet high academic standards, and to devote substantial effort to their schoolwork. This message is delivered clearly and consistently to students by all faculty and staff.

Delivering this message uniformly, to all students in all classes, is more difficult in schools that follow a more bureaucratic model, where staffs are typically divided into specialized departments. In more organic schools, there is less specialization, which makes it easier for staff members to develop and communicate common expectations.

3 - Authentic Instruction.
In a school organized under the bureaucratic model, administrators seek to control education by prescribing the tasks of teaching and learning, and by striving to ensure that those tasks are pursued in a uniform way. Research indicates that this approach doesn't encourage students to develop more advanced thinking skills, higher levels of proficiency in academic subjects, or a sense of themselves as active learners. Instead, they learn to reproduce specific bits of knowledge passed along to them by a teacher or textbook.

In recent years, educators increasingly have called for the adoption of more "authentic" models of instruction and learning. This approach asks students to move beyond reciting fragments of information from memory, and to learn instead how to engage in sustained, disciplined, critical thought on topics relevant beyond school. Simple information can still be presented in a routine fashion, but students also learn through such practices as independent study, project-based instruction, cooperative learning, student evaluation of instructional practices, and learning that looks more like real-world problem solving.

Few high school students experience high levels of authentic instruction. Even in schools working to adopt new methods and strategies aimed at developing authentic instruction, techniques are often implemented for their own sake, with little relevance to other classroom activities or practices. Students from low-income and minority backgrounds, with records of lower achievement, are more likely to find themselves in classrooms that emphasize low-order skills, repetitive drill techniques, and basic knowledge.

Studies show, however, that disadvantaged students can indeed learn complex tasks and information, and that exposure to richer, more authentic learning environments can lead to gains in achievement for all students.[5]

But authentic instruction presents complex challenges to teachers. There is no tried-and-true procedure for bringing it about in every school and classroom. Teachers who want to pursue authentic instruction must think, invent, and reflect on their work.

Usually, this level of uncertainty is handled best when teachers work closely with colleagues, within an organization that supports teamwork and collective responsibility for student learning. In short, authentic instruction seems to demand a communal or organic social organization.

Social Organization

The bureaucratic model views strong personal relationships in a school, among adults or between adults and students, as hindering the learning

process. These relationships are seen as impeding a uniform and efficient implementation of rules and procedures.

This point of view ignores considerable evidence, including studies dating back to the 1930s, that emotional bonds between students and teachers can play a crucial role in engaging and motivating students to learn.[6] Studies of teachers' work also show that strong ties between staff members directly affect teacher commitment, and thereby indirectly affect student achievement.

Communally organized schools seek to promote an environment where students and staff are committed to the mission of the school and work together to strengthen that mission. Interactions between staff members, and between students and staff, are not limited to the classroom, and staff members are encouraged to see themselves as responsible for the total development of students, not just the mastery of one day's lesson. Teachers share a collective sense of responsibility for their students' success, change their teaching to respond to the specific needs of their students, and coordinate their efforts between classrooms and across grades.

Studies show that in communally organized schools, teachers and other staff members experience more satisfaction and higher morale. Students drop out less often and cut fewer classes. And both staff and students post lower rates of absenteeism.[7]

The Previous Findings

This study of school restructuring and student learning follows up on the research presented last fall in *Issues in Restructuring Schools* No. 7, "High School Restructuring and Student Achievement."

In that study, we used data from the National Education Longitudinal Study (NELS) conducted in 1988 and 1990. We examined the academic progress made, and levels of student engagement with school, for 11,794 students in 820 secondary schools across the country. The study measured their academic progress from 8th grade to 10th grade.

We also looked at the types of school reform taking place in (or absent from) those schools. We identified 30 reform practices and classified them as traditional, moderate or restructuring, based on the degree to which they represented significant departures from conventional practice. The "restructuring practices" also represented a movement away from bureaucratically organized high schools and toward a more communal structure. (A complete list of the 30 practices, and the frequency with which they occurred in the schools studied, can be found in Figure 1 on page 3.)

The results of the study were clear and consistent: Schools that implemented three or more restructuring practices posted significantly higher academic achievement than other schools. Those gains also were more equitably distributed among students from different socioeconomic backgrounds. Schools with more traditional reforms in place outperformed schools with no reform practices at all, but didn't perform as well as schools undertaking reforms consistent with restructuring.

We also found strong evidence that students in smaller schools posted significantly higher academic gains, and that those gains were more equitably distributed.

New Questions, New Data

While we felt these findings had significant implications for school-reform efforts, we cautioned against drawing inappropriate conclusions from them. Our findings offered no explanation of *why* these reforms were associated with improved student achievement. And since the study only followed students through 10th grade, we hadn't explored whether the effects of restructuring carried over into learning in the last two years of high school.

This more recent study of high school restructuring followed the same students through 12th grade, and tried to account for the effects of specific reform practices by examining the power of the "organic" organizational

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Studies show that in communally organized schools, teachers and other staff members experience more satisfaction and higher morale, while students drop out less often and cut fewer classes.

High School Restructuring and Student Achievement– Study Findings

The charts in Figure 2 show the impact on student achievement in mathematics and science of four important school characteristics: common curriculum, academic press, authentic instructional practice and collective responsibilty for student learning.

Our analysis of data from the National Educational Longitudinal Study (NELS) indicates that restructuring schools are more likely to exhibit higher levels of these characteristics. And as shown in the charts, students who attend schools with higher levels of these traits learn more than students in other types of schools.

• We estimated the levels of these traits in schools by looking at NELS survey data from teachers and principals. The surveys asked them to report the attitudes and teaching methods at their schools. For example: To estimate the level of collective responsibility for student learning, we included responses to such statements as, "I can get through to the most difficult student," and " I feel that it's part of my responsibility to keep students from dropping out of school." Teacher responses to such statements were tallied for each school surveyed, and schools were ranked as low, medium or high based on the average.

We examined students' achievement growth since 8th grade by examining their scores on mathematics and science questions drawn from the National Assessment of Educational Progress (NAEP). The charts, however, don't represent the number of correct answers on a test. They are "scale scores" derived from a statistical method called Item Response Theory (IRT). These scores are considered more useful for representing gains in mathematics and science achievement by students in different types of schools.

To represent the actual advantage to students attending schools with high, medium and low levels of the four traits, we looked at the results for an "average" student, one whose performance and socioeconomic status fell at the mean of all students who were studied. The achievement gains for these students are averages compiled from students of different genders and ethnic backgrounds.

In both mathematics and science,

Figure 2

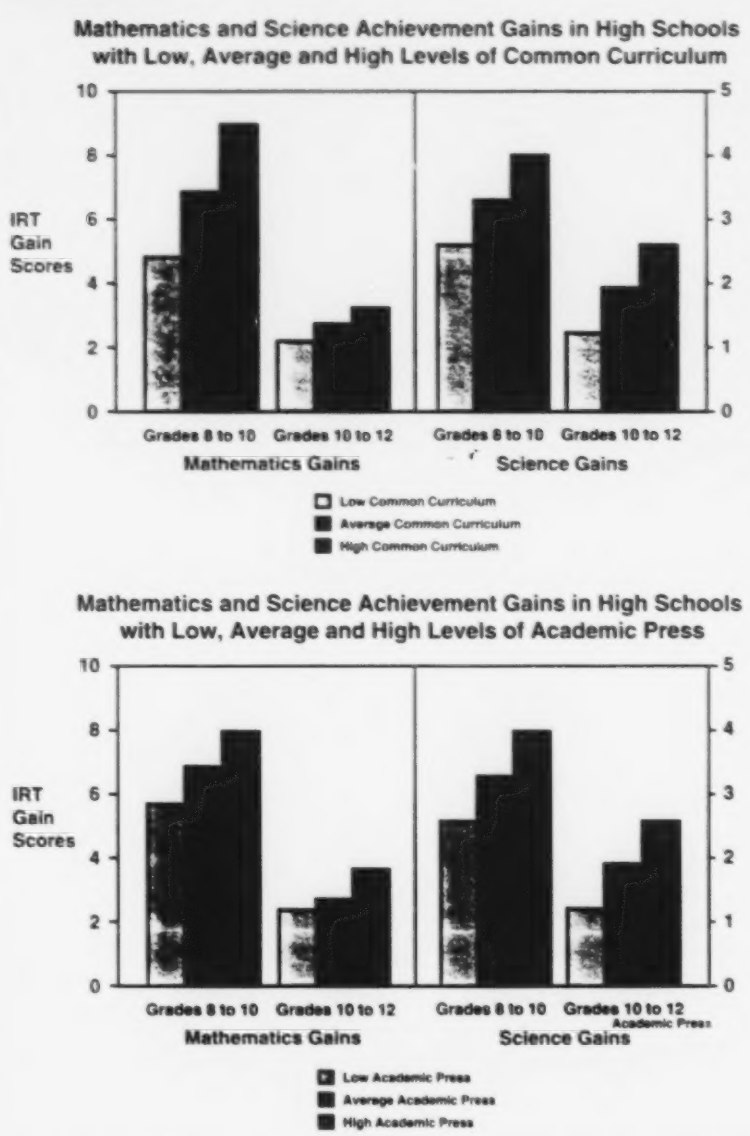
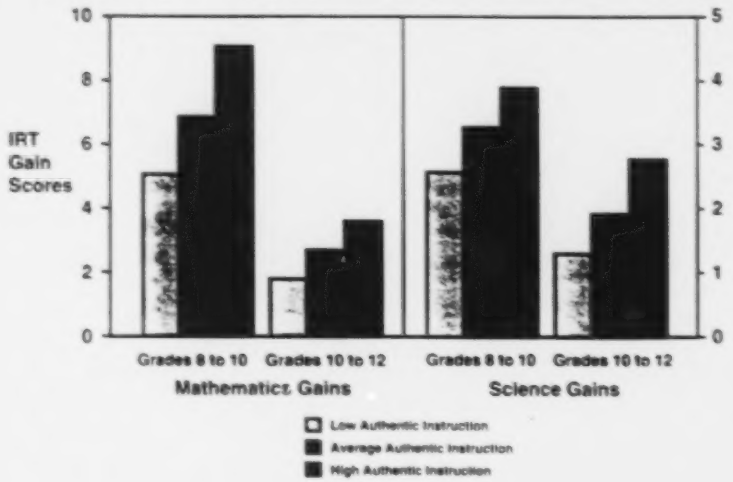
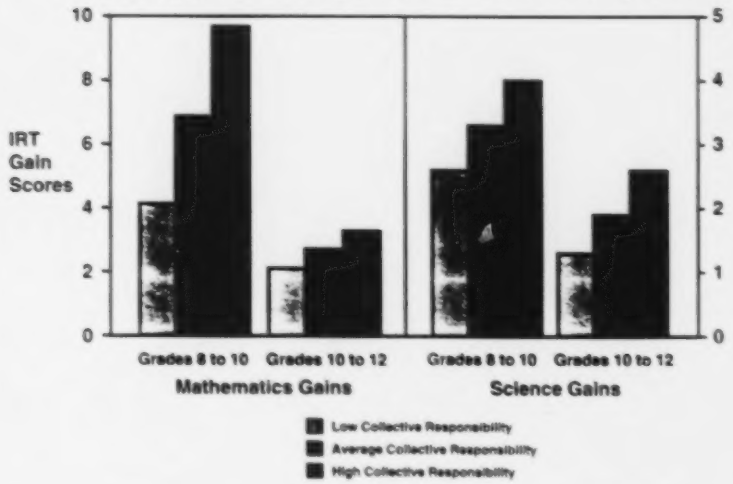


Figure 2

Mathematics and Science Achievement Gains in High Schools with Low, Average and High Levels of Authentic Instructional Practice



Mathematics and Science Achievement Gains in High Schools with Low, Average and High Levels of Collective Responsibility



academic gains are substantially higher in schools with higher levels of these important characteristics. For example, an average student in a school with high levels of authentic instruction would learn about 78 percent more mathematics between 8th grade and 10th grade than a comparable student in a school with low levels of authentic instruction. An average student in a school with high levels of collective responsibility would learn more than twice as much science between 10th grade and 12th grade as a similar studentat a school with low collective responsibility.

Both students would post gains during those years, but the student in the school with higher collective responsibility would learn much more.

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features, both social and academic, described earlier.

This study incorporates another wave of NELS data, gathered in 1992, which describes the academic performance and school experience of those students as high-school seniors. Despite the difficulties of locating the same students two years later and developing significant data on their academic progress, the sample remains large: 9,570 students in 789 high schools.

Our first study looked at student engagement and academic achievement in four subjects: math, science, history and reading. In order to simplify this latest study, and to capitalize on good NELS data on instruction in math and science classrooms, we restricted our analysis of academic performance data to learning in those two subjects.

As in our earlier study, we used a statistical procedure known as Hierarchical Linear Modeling (HLM) to analyze the data. This allowed us to estimate the impact on students' learning for specific factors we wished to examine, and to control for the effects of socio-economic status, previous academic success and other factors that can influence student achievement. With HLM, we also were able to account for the effects of school factors, such as average socio-economic status, racial composition and school sector.

Findings

When we look at student academic progress from 10th to 12th grade, we find that students learn somewhat less in these subjects during the last half of high school than they do in the first half. However, the achievement gains associated with restructuring are maintained. Even after taking into account the demographic and structural characteristics of students and schools, students in restructuring

In the later high school years, students in restructuring schools continue to post significantly larger academic gains, in both math and science, than students in other types of schools. In fact, the restructuring effects on learning actually increase.

schools continue to post significantly larger academic gains, in both math and science, than students in other types of schools. In fact, the restructuring effects on learning actually increase during the later years of high school. (Student gains in history and reading also continue, though this analysis doesn't address those subjects.)

Similarly, the greater equity found for restructuring schools from 8th to 10th grade is sustained from 10th to 12th grade, and may even increase during the later high school years.

We also found evidence that the positive relationship between smaller schools and student learning remains strong from 10th to 12th grade. In both the early and late high school years, students are learning more in smaller schools, and the performance gaps between students from different backgrounds are smaller as well.

Even more important, in our opinion, were our findings about the impact on student learning of the organic characteristics of school organization described above. We found that the presence of these features explained much of the improvement in student learning noted for restructured schools.

Among the most important findings:

Common Academic Curriculum

The academic organization of schools has the strongest impact on improved student achievement and equity. More math and science courses in a school, and a lower variation among students in the number of math and science courses taken, were strong predictive factors for schools with high levels of learning in these subjects. In such schools, where course offerings are narrow and academic content is strong, students learn more, and learning is more equitably distributed.

This is explained by the fact that in schools classified as restructuring, students take more advanced math and science courses, and all students take pretty much the same subjects.

Academic Press

We also saw a strong connection between "academic press," meaning the expectation that all students will meet high academic standards and devote considerable effort to academic pursuits, and greater learning in math and science. In more organically organized schools, there is less specialization and departmentalization of faculty, and so teachers have more opportunities to collaborate, making it easier to develop common expectations and convey them consistently to students.

This factor appeared to be more closely associated with achievement in science than in math, however.

Authentic Instruction

When the level of authentic instruction in math and science is higher in a school, and when that level is more consistent across different classes and students, achievement gains are higher in those subjects. In schools that are instructionally rich and incorporate active learning, and where this type of instruction is widespread throughout the school, students learn more and learning is more equitably distributed.

Social Organization

Schools that demonstrate a higher level of social organization post greater and more equitable gains in student achievement in math and science.

For the purposes of this study, we define social organization by examining one factor: collective responsibility for student learning. In schools where most teachers feel they can make a real difference in the academic performance of students–instead of blaming low performance on students' attitudes, background and other factors beyond teachers' control–students learn more and learning is more equitably distributed. In schools organized under a more organic model, teachers are more likely to assume this responsibility. The organic model also provides more opportunity for teachers, working together, to examine and adapt their practices to reflect student needs.

The impact of each of these factors on student learning in math and science is shown in the series of charts in Figure 2 on pages 6 and 7. These charts measure gains in student achievement with scores derived from Item Response Theory. For example, an "average" stu-

dent who attended a school with a high level of authentic instruction would learn about 78 percent more math between 8th grade and 10th grade than a comparable student in a school with a low level of authentic instruction.

Students in schools scoring high on the other factors we studied also had advantages over students in schools with low scores. We found that the restructured schools had higher levels of these organizational characteristics than schools with more traditional reforms, or no reforms, in place.

But this doesn't mean that schools can boost student learning merely by adopting the specific reform practices listed in Figure 1 on page 3. It is the organizational characteristics, not the specific practices, that seem to make the difference.

Discussion

Our earlier study of high school restructuring and student learning, and information gathered for this more recent study, together offer valuable information on how schools can be organized to promote both greater learning and greater educational equity.

It is clear that school organization really matters. Furthermore, we think we have identified some specific attributes that help explain the success of restructuring efforts. These attributes seem to move schools in a particular direction.

Once again, we find ourselves drawn to examining this question by contrasting bureaucratic school organization with the more organic model. The big, comprehensive high school has been widely accepted in this country. This notion has rarely been challenged: Even in recent times, large high schools run in a top-down manner have been widely viewed as the best venues for efficiently distributing technological and human resources to foster achievement. Making many choices available, in order to respond to students with different skills and interests, has generally been considered the best way to address the growing diversity among high school students.

We disagree. We contend that there is now strong evidence that schools, especially high schools, should move toward smaller, more organic structures in order to do a better job. What's more, rather than shrinking away after the first two years of high school, where we might expect to see the most influence on students by their new schools, these effects endure. In fact, the effects actually increase somewhat in grades 11 and 12 (although learning itself isn't as dramatic during those years).

This doesn't mean that schools should expect quick improvement in student achievement if they move to adopt these reforms. The characteristics that many of these specific reform practices seek to enhance–such as consistently high levels of authentic instruction, and collectively held attitudes among teachers about student learning and their responsibility for it–cannot be nurtured within a school without a great deal of hard, focused work. Our analysis also suggests that many of the reforms we studied had been in place for years, the fruits of a sustained effort at care and fertilization.

We hope, however, that our results help clarify the sorts of reform efforts that can help all students learn more, given time and adequate support.

For example: The school-within-a-school model, which divides a large student body into smaller units of students and staff, could be a promising strategy for nurturing a "school family" atmosphere within an otherwise impersonal big-school environment. Many of the other reforms we discuss here are also easier to accomplish in smaller schools.

The NELS data didn't allow us to look specifically at the effectiveness of schools within schools. And there is evidence that reform efforts along those lines can lead to unfortunate

In schools that are instructionally rich and incorporate active learning, and where this type of instruction is widespread throughout the school, students learn more and learning is more equitably distributed.

We contend that there is now strong evidence that schools, especially high schools, should move toward smaller, more organic structures in order to do a better job.

divisions among the different groups within a larger school, if the school ends up creating "specialty shops" in high schools. Nevertheless, if these problems can be overcome, a more communal environment would help foster the types of social organization that we now see as critical to helping high school students learn more. In such schools, we'd expect to see less hierarchy, more cooperation, and much higher levels of teacher collaboration. Teachers also would be more likely to believe they could succeed in teaching all their students, and to devote substantial effort to doing so, instead of blaming poor performance on the students, their families, and the community beyond school.

Schools also need strong academic structures. As we have shown, a narrow curriculum has positive effects on students, especially when it is tied to a strong academic focus and a high level of academic press. In a school with these qualities, classroom practice should be more authentic, and authenticity should be widespread, not limited to a few good classes.

It's difficult to say how such dramatic reforms could be implemented on a widespread basis, especially given that so many different advocates put forth so many different visions of school reform. We hope, however, that the results of our study help schools cut through this vagueness, and that a more desirable direction for change is becoming clearer.

Endnotes

[1]For a more detailed discussion of this earlier study, see *Issues in Restructuring Schools* No. 7, Fall 1994. Copies are available free of charge and may be ordered using the order form at the back of this issue report.

[2]The complete research paper, *"Understanding High School Restructuring Effects on the Equitable Distribution of Learning in Mathematics and Science,"* which is summarized in this issue report, is available through the Document Service of the Wisconsin Center for Education Research. For ordering information contact Document Service, WCER, 1025 W. Johnson St., Room 242, Madison, WI 53706.

[3]See Rowan, B. (1990). Commitment and control: Alternative strategies for the organizational design of schools. In C. Cazden (Ed.), *Review of research in education:* Vol. 16 (pp. 353-389). Washington, DC: American Educational Research Association.

Also see Bryk, A. S., & Driscoll, M. E. (1988). *The high school as community: Contextual influences, and consequences for students and teachers.* Madison, WI: University of Wisconsin-Madison, National Center on Effective Secondary Schools.

[4] See Bryk, A. S., Lee, V. E., & Holland, P. B. (1993). *Catholic schools and the common good.* Cambridge, MA: Harvard University Press.

[5]For a more detailed discussion, see *Issues in Restructuring Schools* No. 8, Spring 1995. Copies are available free of charge and may be ordered using the order form at the back of this issue report.

[6]See Waller, W. (1932). *The sociology of teaching.* New York: Russell & Russell.

[7] See Bryk, Lee, & Holland, op. cit.